Dogwood, Hydrangea Chemicals Foil Key Crop Pests

Hydrangeas and dogwoods have more than beautiful flowers. The leaves from these plants contain chemicals that kill or stunt the growth of two key crop pests, U.S. Department of Agriculture scientists report.

Entomologists Billy R. Wiseman and James E. Carpenter of USDA's Agricultural Research Service in Tifton, Georgia, started on the research a few years ago as part of

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an ongoing effort to find and test natural products from plants that can be used as insecticides against the corn earworm and fall armyworm.

To find the plants, Wiseman didn't have to go far. He simply went into his backyard and picked leaves not only from his hydrangea bushes and dogwoods, but also from black cherry and Bradford pear trees.

At the agency's Insect Biology and Population Management Research Laboratory in Tifton, the researchers dried the leaves, ground them up, and added them to the pinto-bean-based lab diet they feed to their earworm and armyworm larvae.

"The hydrangea diet killed 100 percent of newly hatched larvae within 2 days," says Wiseman. "The dogwood, cherry, and pear leaf diets severely retarded the growth of the larvae. The larvae fed on them, but they couldn't digest them."

Earworm larvae cause an estimated 5- to 10-percent loss each year to corn, cotton, soybean, and other crops. Armyworm larvae damage about \$30 to \$40 million worth of corn, grasses, and other crops in the southeastern United States.

The scientists are looking for an outside cooperator to help identify the active insecticidal ingredients in the leaf chemicals and to develop spray or bait formulations for these natural pest controls. Once the active ingredients are identified, Carpenter says, it may be possible to genetically engineer the insecticidal compounds into crop plants.—By **Sean Adams**, ARS.

Billy R. Wiseman and James E. Carpenter are at the USDA-ARS Insect Biology and Population Management Research Laboratory, P.O. Box 748, Tifton, GA 31793; phone (912) 387-2340/2348, fax (912) 387-2321, e-mail bwiseman@tifton.cpes.peachnet.edu
jcarpent@tifton.cpes.peachnet.edu ◆

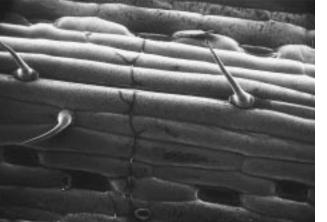
Fuzzy Leaves Confuse Fungi

Like snakes on the head of the mythical Greek Medusa, leafhairs on the surface of wheat and rye plants entangle and confuse germinating fungal spores. This protects these important grain crops from disease, say scientists at the ARS Cereal Rust Laboratory in St. Paul, Minnesota.

Puccinia recondita, a fungal disease of wheat and rye, infects thousands of acres of both crops each year and

causes millions of dollars in crop losses, says plant pathologist David Long. The fungus is called a rust because it discolors leaves and makes diseased plants appear as though they are oxidizing, or rusting.

Based on pioneering work by ARS plant pathologist John Roberts, who is now retired, Long and others



The dark, wavy, vertical line in the center of this micrograph is an infection tube of the fungus, *Puccinia recondita*, growing toward a leaf opening, or stoma. Magnified about 220x.

were able to test a theory proposed by the late N.A. Cobb. That USDA plant pathologist theorized that plant leaf hairs interfere with fungal infection. The scientists examined leaf surfaces with a scanning electron microscope. They found that when fungal spores land on a leaf surface, they send out tiny "infection tubes" that seek out the plant's stomata—minuscule openings in the leaf surface that allow the exchange of carbon dioxide.

"When a spore lands on a leaf surface with a lot of leaf hairs, it becomes 'confused' and dies before the infection tube can locate a stoma to complete the fungus' life cycle," says Long.

He and Roberts showed a 27-percent reduction in disease infestation in wheat and rye hybrids with higher numbers of leaf hairs. "We think this is good information for wheat and rye breeders to take under consideration when developing new varieties," says Long. "In addition, the leaf hairs also confer resistance to some insect pests."—By **Dawn Lyons-Johnson**, ARS.

David L. Long is at the USDA-ARS Cereal Rust Laboratory, University of Minnesota, 1551 Lindig, St. Paul, MN 55108; telephone (612) 625-1284, fax (612) 649-5054, e-mail davidl@puccini.crl.umn.edu ◆